



## Are stroke occurrence and outcome related to weather parameters? Results from a population-based study in northern Portugal

**Author(s):** Magalhaes R, Silva MC, Correia M, Bailey T  
**Year:** 2011  
**Journal:** Cerebrovascular Diseases (Basel, Switzerland). 32 (6): 542-551

### Abstract:

**BACKGROUND:** Changes in meteorological parameters have been associated with cardiovascular mortality and stroke. The high incidence of stroke in Portugal may be modelled by short- or long-term weather changes whose effect may be different across stroke types and severity. **METHODS:** Data include all patients with a first-ever-in-a-lifetime stroke registered in a population of 86,023 residents in the city of Porto from October 1998 to September 2000. Specific stroke types were considered and ischaemic stroke (IS) subtype was defined according to the Oxfordshire Community Stroke Project classification and the Trial of Org 10172 in Acute Stroke Treatment (TOAST) criteria. Information on daily temperature, humidity and air pressure was obtained from the National Meteorological Office. The Poisson distribution was used to model the daily number of events as a function of each weather parameter measured over different hazard periods, and the binomial model to contrast effects across subgroups. Differential effects of meteorological parameters and hazard periods upon stroke occurrence and outcome were analysed in a stepwise model. **RESULTS:** Among the 462 patients registered, 19.6% had a primary intracerebral haemorrhage (PICH) and 75.3% an IS. Among patients with IS, 21.6% were total anterior circulation infarcts (TACIs), 19.8% partial anterior circulation infarcts (PACIs), 19.5% posterior circulation infarcts (POCIs) and 39.1% were lacunar infarcts (LACIs). The aetiology of IS was large artery atherosclerosis in 6.9%, cardioembolism in 23.3% and small artery occlusion in 35.6%. The incidence of PICH increased by 11.8% (95% CI: 3.8-20.4%) for each degree drop in the diurnal temperature range in the preceding day. The incidence of IS increased by 3.9% (95% CI: 1.6-6.3%) and cardioembolic IS by 5.0% (95% CI: 0.2-10.1%) for a 1 degrees C drop in minimum temperature in the same hazard period. The incidence of TACIs followed the IS pattern while for PACIs and POCIs there were stronger effects of longer hazard periods and no association was found for LACIs. The relative risk of a fatal versus a non-fatal stroke increased by 15.5% (95% CI: 6.1-25.4%) for a 1 degrees C drop in maximum temperature over the previous day. **CONCLUSIONS:** Outdoor temperature and related meteorological parameters are associated with stroke occurrence and severity. The different hazard periods for temperature effects and the absence of association with LACIs may explain the heterogeneous effects of weather on stroke occurrence found in community-based and hospital admission studies. Emergency services should be aware that specific weather conditions are more likely to prompt calls for more severe strokes.

**Source:** <http://dx.doi.org/10.1159/000331473>

### Resource Description

**Communication:**

## Climate Change and Human Health Literature Portal

resource focus on research or methods on how to communicate or frame issues on climate change;  
surveys of attitudes, knowledge, beliefs about climate change

A focus of content

### **Communication Audience:** ☒

audience to whom the resource is directed

Health Professional

### **Early Warning System:** ☒

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

### **Exposure :** ☒

weather or climate related pathway by which climate change affects health

Meteorological Factors, Meteorological Factors, Temperature

### **Geographic Feature:** ☒

resource focuses on specific type of geography

None or Unspecified

### **Geographic Location:** ☒

resource focuses on specific location

Non-United States

**Non-United States:** Europe

**European Region/Country:** European Country

**Other European Country :** Portugal

### **Health Impact:** ☒

specification of health effect or disease related to climate change exposure

Cardiovascular Effect

**Cardiovascular Effect:** Stroke

### **Medical Community Engagement:** ☒

resource focus on how the medical community discusses or acts to address health impacts of climate change

A focus of content

### **Mitigation/Adaptation:** ☒

mitigation or adaptation strategy is a focus of resource

# Climate Change and Human Health Literature Portal

Adaptation

**Resource Type:** 

format or standard characteristic of resource

Research Article

**Timescale:** 

time period studied

Time Scale Unspecified

**Vulnerability/Impact Assessment:** 

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content